

Remarks:

These remarks are responsive to the Office action dated August 23, 2007. Prior to entry of this response, claims 1-9 and 11-26 were pending in the application. By way of this response, claims 1, 9, 15, and 20 are amended, claim 25 is cancelled, and claims 27-32 are added. Applicants respectfully request reconsideration of the application and allowance of the pending claims.

Allowable Subject Matter

Claim 25 is indicated to be allowable if rewritten in independent form.

Applicants thank the Examiner for the indication of allowable subject matter and have amended claim 20 to include the limitations of original claim 25. Accordingly, Applicants believe independent claim 20 to be in condition for allowance. Claims 21-24 and 26 depend from claim 20. Therefore, claims 21-24 and 26 are believed to be in a condition for allowance for at least the same reason.

Rejections under 35 U.S.C. § 102

Claims 1-9, 11-24, and 26 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent Number 3,884,207 (Kuehn).

The Office action cites Kuehn as teaching features of previously presented claim 1 including, "a first electromechanical actuator coil coupled to a cylinder valve of an internal combustion engine and a second electromechanical actuator coil." The Office action cites col. 3, lines 30-31 of Kuehn as teaching the claimed feature. Specifically, Kuehn recites:

In FIG. 1, the ignition coil for cylinder A is identified 30 by numeral 36 and that for cylinder B is identified by numeral 38. In implementing the present invention in

Applicants respectfully disagree with the assertions of the Office action. In particular, Kuehn discloses an *ignition* coil for a cylinder. Kuehn also states that

a solid-state discharge control circuit is provided which, when triggered on, permits a controlled current pulse to flow through the ignition coil for the purpose of inducing a high tension voltage across the gap of a spark plug (See col. 2, lines 4-9). Kuehn only discloses a circuit including ignition coils of spark plugs which may be energized to create a spark for combustion. Moreover, Kuehn makes no mention of a cylinder valve or an electromechanical actuator coil coupled to the valve.

In order to further prosecution of this application, Applicants have amended claim 1 to further distinguish the claimed subject matter from Kuehn and to include, among other features, "a first electromechanical actuator coil coupled to a first intake or exhaust valve of a first cylinder of an internal combustion engine, the first electromechanical actuator coil to control actuation of the first intake or exhaust valve between an open position and a closed position, a second electromechanical actuator coil coupled to at least one of the first intake or exhaust valve and a second intake or exhaust valve to control actuation of the at least one of the first intake or exhaust valve and the second intake or exhaust valve between an open position and a closed position."

As discussed above, Applicants can find no disclosure by Kuehn of an electromechanical actuator coil coupled to an intake or exhaust valve of a cylinder. Further, Applicants can find no disclosure by Kuehn of controlling actuation of an intake or exhaust valve between an open position and a closed position using one or more electromechanical actuator coils.

Therefore, Applicants respectfully request the rejection of claim 1 be withdrawn for at least the reasons discussed above. Claims 2-9 and 27-31 depend from amended claim 1. Thus, Applicants respectfully request the rejection of claims 2-9 and 27-31 be withdrawn for at least the reasons discussed above.

Applicants have amended independent claim 9 to include, among other features, "a dual-coil half bridge converter adapted to be coupled to a single or multiple coil actuator of an intake or exhaust valve of a cylinder in an internal combustion engine, the converter being powered to control actuation of the

intake or exhaust valve between an open position and a closed position." As discussed above, Applicants can find no disclosure by Kuehn of a single or multiple coil actuator for controlling actuation of an intake or exhaust valve between an open position and a closed position.

Rather, Kuehn only discloses energizing an ignition coil to create a spark in a spark plug for the purpose of combustion and does not recognize the advantages of Applicants claimed features.

Therefore, Applicants respectfully request the rejection of claim 9 be withdrawn for at least the reasons discussed above. Claims 11-14 depend from amended claim 9. Thus, Applicants respectfully request the rejection of claims 11-14 be withdrawn for at least the reasons discussed above.

Applicants have amended independent claim 15 to further distinguish the claimed subject matter from the disclosure of Kuehn. In particular, amended claim 15 includes features of a half bridge power converter system for actuation of one or more cylinder valves. Specifically, amended claim 15 recites, "A dual coil half bridge power converter system, comprising: a power source; an intake or exhaust valve of a cylinder, in an internal combustion engine, the valve having an armature and at least one spring; a single or multiple coil actuator coupled to the intake or exhaust valve, the actuator configured to control lift of the intake or exhaust valve between an open position and a closed position by selectively driving the armature against the force of the at least one spring; only one actuating switch for actuating each coil in said actuator; and an energy storage device for storing energy during deactivation of at least one coil."

As discussed above, Applicants can find no disclosure by Kuehn on a cylinder valve let alone a single or multiple coil actuator configured to control lift of an intake or exhaust valve of a cylinder. Moreover, Applicants can find no disclosure by Kuehn of an intake or exhaust valve having an armature and at least one spring and an actuator configured to control lift of the intake or exhaust valve by driving the armature against the spring force of the spring.

In contrast, Kuehn discloses an ignition system and generating spark in a spark plug.

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Therefore, Applicants respectfully request the rejection of claim 15 be withdrawn for at least the reasons discussed above. Claims 16-19 depend from amended claim 15. Thus, Applicants respectfully request the rejection of claims 16-19 be withdrawn for at least the reasons discussed above.

New Claims

Applicants have added new claims 27-31 that depend directly or indirectly from independent claim 1. As discussed above, Kuehn does not teach or suggest each and every element of amended claim 1. Thus, Applicants believe amended claim 1 to be in condition for allowance. Accordingly, Applicants believe new claims 27-31 to be allowable for at least the same reasons.

Furthermore, claim 27 recites, "The system of claim 1 wherein the first electromechanical actuator coil and the second electromechanical actuator coil control actuation of different intake or exhaust valves of different cylinders and the charge balance is maintained on said first and second energy storage devices based on a coordinated firing order of the different cylinders."

Applicants can find no disclosure by Kuehn of two electromechanical actuator coils for actuating intake or exhaust valves of two different cylinders. Rather, Kuehn only discloses ignition coils for generating a spark of a spark plug for the purpose of combustion.

Furthermore, claim 28 recites, "The system of claim 1 wherein the first electromechanical actuator coil and the second electromechanical actuator coil cooperatively control actuation of the first intake or exhaust valve between a substantially fully open position and a substantially fully closed position."

Applicants can find no disclosure by Kuehn of two electromechanical actuator coils to control actuation of the same intake or exhaust valve. Rather, Kuehn only discloses using one coil to energize each spark plug to generate a spark for ignition.

Furthermore, claim 29 recites, "The system of claim 1 wherein the first electromechanical actuator coil controls actuation of the first intake or exhaust valve and the second electromechanical actuator coil controls actuation of the

second intake or exhaust valve."

Applicants can find no disclosure by Kuehn controlling valve actuation via an electromechanical actuator coil let alone that each coil may control a different intake or exhaust valve. Rather, Kuehn controls ignition in a spark plug via an electromechanical actuator coil.

Furthermore, claim 30 recites, "The system of claim 29 wherein the first intake or exhaust valve is in operative communication with the first cylinder and the second intake or exhaust valve is in operative communication with the first cylinder."

Applicants can find no disclosure by Kuehn of the claimed configuration of claim 29.

Furthermore, claim 31 recites, "The system of claim 29 wherein the first intake or exhaust valve is in operative communication with the first cylinder and the second intake or exhaust valve is in operative communication with a second cylinder."

Applicants can find no disclosure by Kuehn of the claimed configuration of claim 31.

Applicants have added new claim 32 that depends directly or indirectly from independent claim 11. As discussed above, Kuehn does not teach or suggest each and every element of amended claim 9 from which claim 11 depends. Thus, Applicants believe amended claim 9 to be in condition for allowance. Accordingly, Applicants believe new claim 32 to be allowable for at least the same reasons.

Furthermore, claim 32 recites, "The system of claim 11 wherein the charge balance is maintained by disabling at least some of the plurality of cylinders in natural charge sharing pairs."

Applicants can find no disclosure by Kuehn of maintaining a charge balance by disabling operation in a plurality of cylinders in charge neutral pairs. Rather, Kuehn only discloses alternating ignition of spark plugs in two cylinders without mention of deactivation of both of the cylinders.

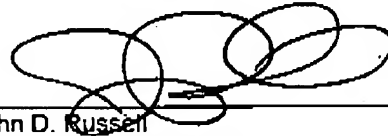
Conclusion

Applicants believe that this application is now in condition for allowance, in view of the above amendments and remarks. Accordingly, Applicants respectfully request that the Examiner issue a Notice of Allowability covering the pending claims. If the Examiner has any questions, or if a telephone interview would in any way advance prosecution of the application, please contact the undersigned attorney of record.

Please charge any cost incurred in the filing of this Response, along with any other costs, to Deposit Account No. 06-1510.

Respectfully submitted,

ALLEMAN HALL MCCOY RUSSELL & TUTTLE LLP



John D. Russell
Registration No. 47,048
Customer No. 36865
Attorney/Agent for Applicants/Assignee
806 S.W. Broadway, Suite 600
Portland, Oregon 97205
Telephone: (503) 459-4141
Facsimile: (503) 459-4142